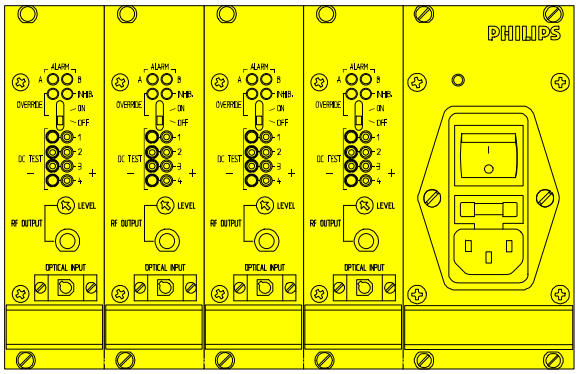
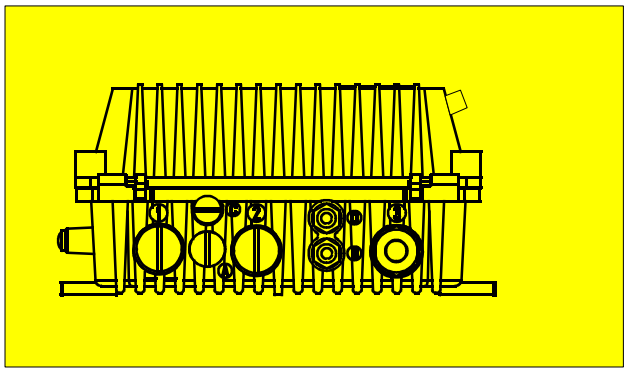
PHILIPS Broadband Fiber Optic System





FOP 0330/221 - FOP 0330/321

FOP 0435/021

FOP 0508/011

FOP 0510/011

DIRECTIONS FOR USE

CE

English

02/98 3911 621 74581

PHILIPS

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1. GENERAL DESCRIPTION

The optical return path equipment are used in HFC networks to carry the return signals over optical fibre from the optical node back to the headend.

It is primarily dedicated to be carriage of return signals for Pay TV, telephony and Internet services, but may also be used for transporting some video channels.

The system includes two parts :

- The return path transmitter
- The return path receiver

➔ The FOP 0330/x21 return path transmitter is part of the “Return Path RTR-200” family. It is fully compatible with the optical return path receiver FOP 0435/021, for point-to-point fibre links.

downstream optical node.

It is compatible with the monitoring system used in the RTR-200

The family is made of 2 versions :

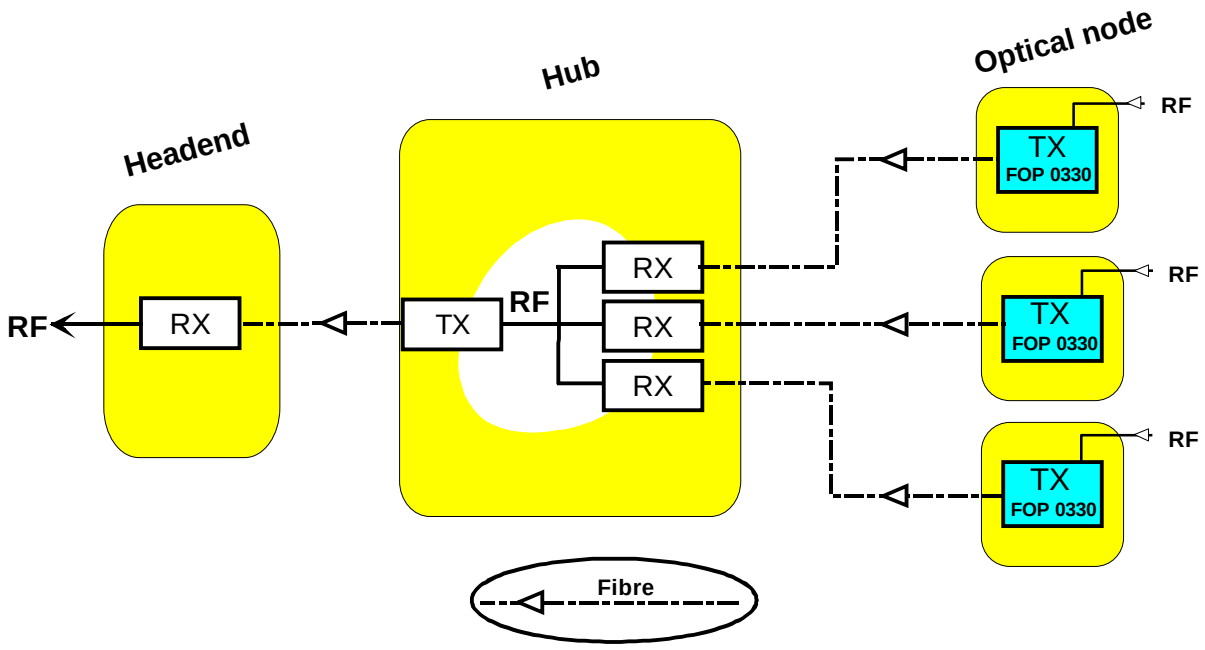
- the FOP 0330/221, mains powered version.
- the FOP 0330/321, powered with 60 Vac CATV line voltage or 48 Vdc telecom voltage.

➔ The FOP 0435/021 return path receiver is mounted in a 19” FOP 0508/011 rack close

The two assemblies fit into an optical system as described in the diagram below :

Return path block diagram

For a cascade of 2 links

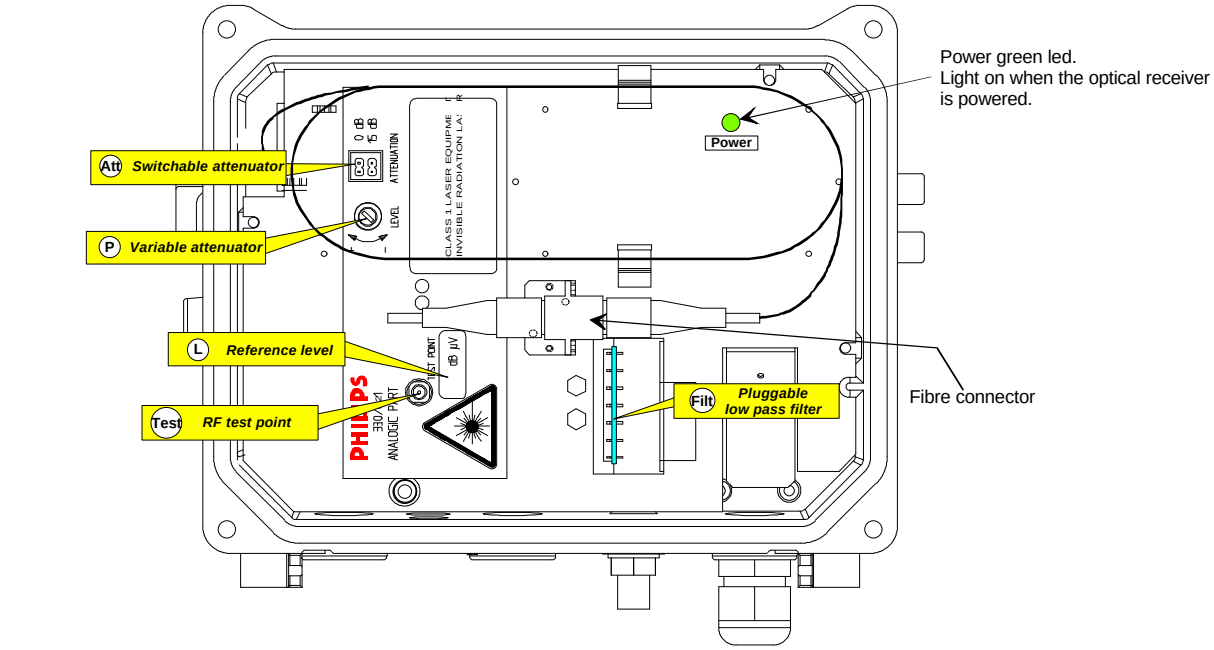


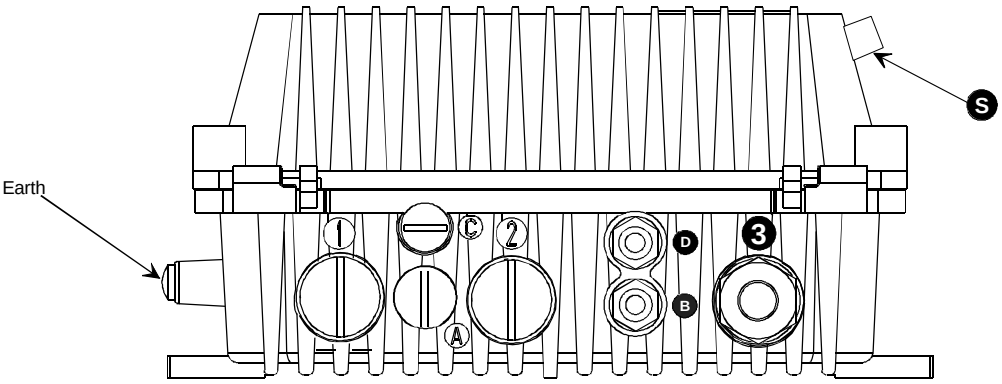
TX : Transmitter

RX : Receiver

2. FOP 0330/x21 RETURN PATH TRANSMITTER

2.1 Overview

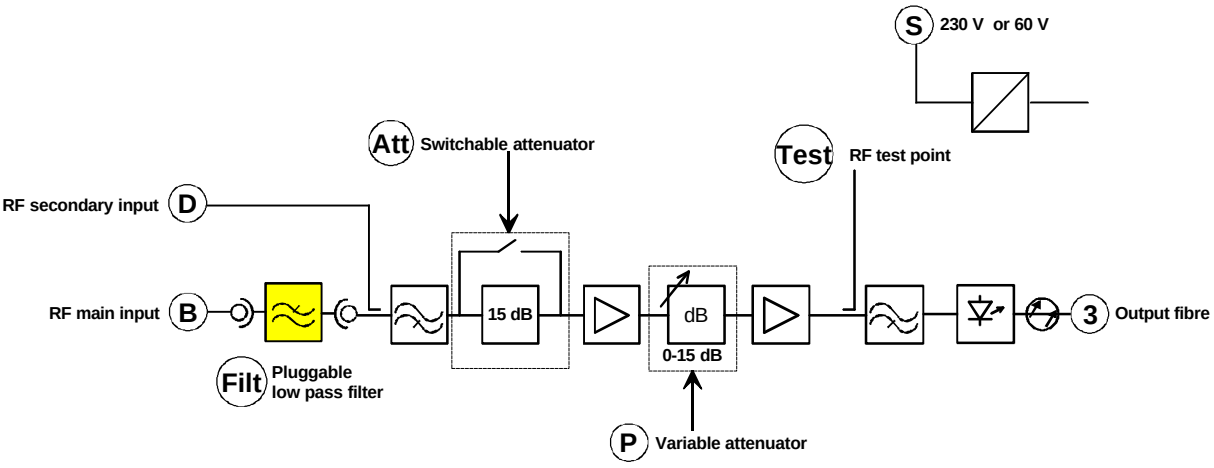




Inputs and output description

B - RF main input
D - RF secondary input
S - Power supply input
3 - Output Fibre

2.2 block diagram

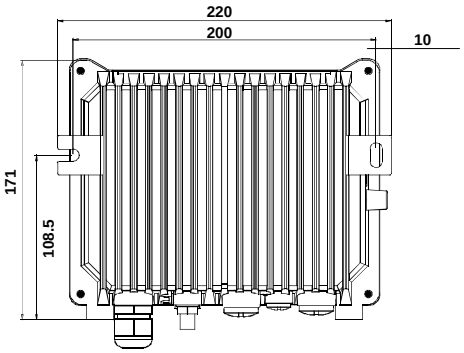


2.3 Mechanical installation

2.3.1 Preliminaries

Unpack the amplifier and proceed to a visual inspection in case of damages due to transportation. If any, contact the carrier.
The pack is made of one optical return path transmitter and the Installation and User Manual
It is equipped with an ”all-pass” filter **(Filt)** (ref : PAS 0226/621).

2.3.2 Mounting the product



The amplifier must be installed in well ventilated place and without any water drop in a shelter or street cabinet.

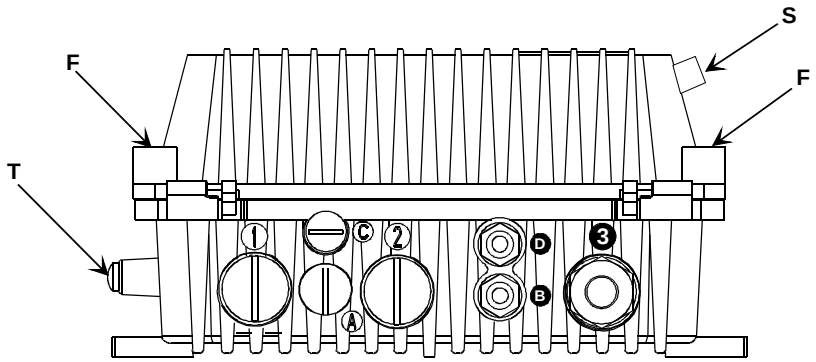
Anchor the amplifier vertically, preferably placing connectors at the bottom, with two ∅ 6 mm screws.

Dimensions : underface view.

2.3.3 Closing the product

a) Check carefully that no water or any moisture is present in the box. If so, remove it.
b) Tighten the four Allen screws (F) on the cover, **with a 4-5 N.m torque**.

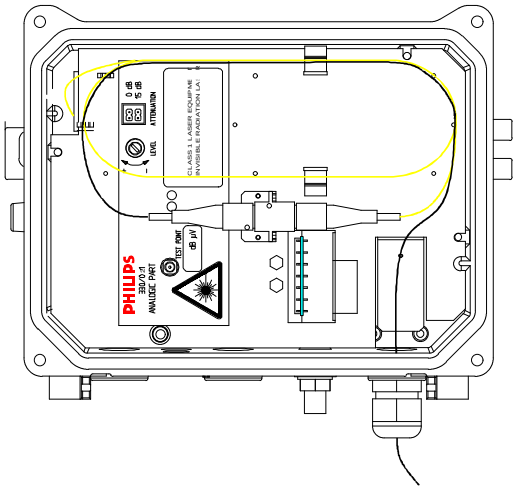
2.3.4 Connectors



Connector number	Connector type	Function	Torque load N.m
B	F	RF main input	9
D	F	RF secondary input	9
3	Wire press	Output fibre	2.5
T	Screw	Earth connection	1.2
F	Screw	Closing the product	4-5

2.4 Electrical / Optical

2.4.1 Optical fibre connection



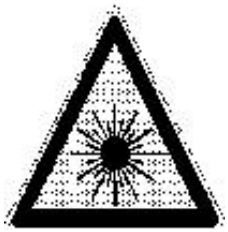
Connect the optical fibre according to the next drawing. Use the anchors to guide the fibre. Carefully position the fibre avoiding short bends that could break the fibre.

Remark :
Before connecting the optical fibre to the transmitter, the connector should be cleaned carefully :
- Moisten the optical cleaning tip (lint-free) with alcohol.
- Clean the end of the connector.
- Dry it with dry air spray.

Important notice

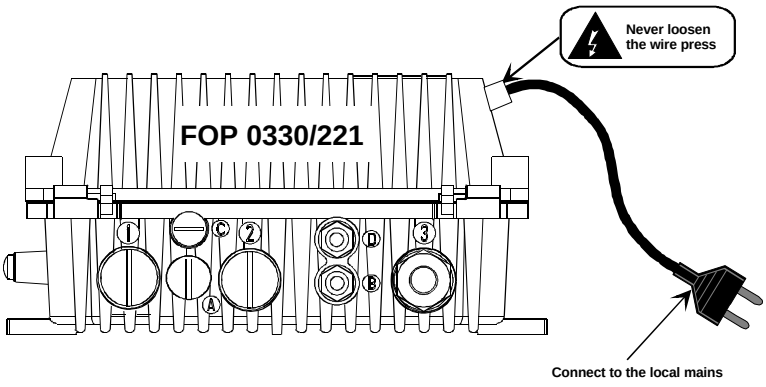
The transmission quality depends strongly on the optical link quality. Any dirty or defective optical connector will create optical reflections that may cause poor intermodulation and CNR results.

CAUTION
Do not look into the optical connector of the transmitter with power applied. Invisible LASER light may damage the eyes.



2.4.2 Power supply

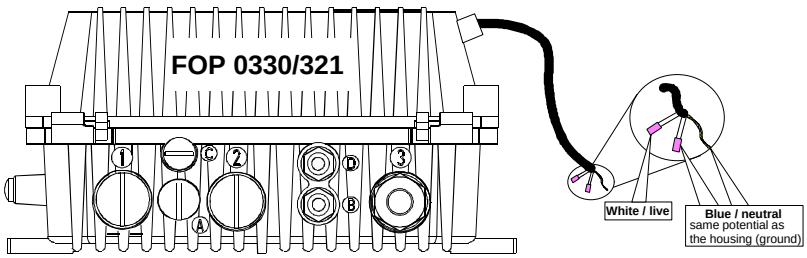
a) Mains supply



CAUTION
RISK OF ELECTRICAL SHOCK

Caution : to reduce the risk of electrical shock, do not open under rain

b) Local current injection



Connect to the local power source according to the drawing.

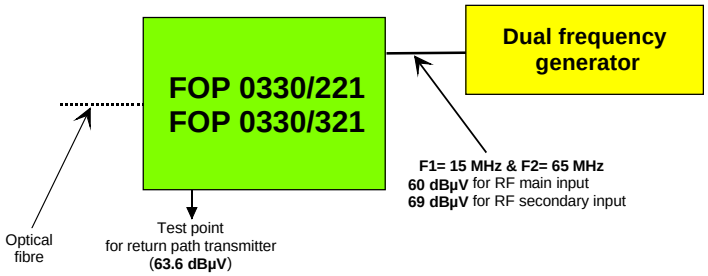
2.4.3 Safety

Fuse : T 2AL.
The power fuse can be only replaced by a PHILIPS qualified installer.
Any opening attempt of the power part of the machine immediately causes the guarantee obsolescence.

2.5 Commissioning of transmitter

Procedure	Example
Equipment needed : - Dual frequency generator (F1 & F2). - Spectrum analyser	**Full band QPSK 15 to 65 MHz**
❶ Plug in the low pass filter **(Filt)** according the needed return path bandwidth.	
❷ Read the reference level on sticker **(L).** (see page 3)	❷ Reference level : **77.6dBµV**
❸ Connect a spectrum analyser to the output test point **(Test)** of the return path transmitter. (see page 3)	
❹ Connect the frequency generator to the RF main input **(B)** or secondary input **(D)**. Adjust the frequency F1 and F2 and also the generator output level according to the bandwidth as indicated in the table below.	❹ F1= **15 MHz** F2= **65 MHz**. Output level = **60 dBµV** for the RF main input or **69 dBµV** for the RF secondary input.
❺ Adjust the test point level, by using the variable attenuator **(P)** and the switchable attenuator **(Att)**, to a value equal to the reference level minus Δ (see table below).	❺ Test point level = Reference level - Δ = **77.6 dBµV - 14 dB** = **63.6 dBµV**

Bandwidth used for QPSK channels	Output level (dBµV)	F1 (MHz)	F2 (MHz)	Δ = Level difference for test point (dB)
10 to 30 MHz	**60**	**10**	**30**	**11.5**
15 to 55 MHz	**60**	**15**	**55**	**13.5**
15 to 65 MHz	**60**	**15**	**65**	**14**


Dual frequency generator
FOP 0330/221
FOP 0330/321
F1= 15 MHz & F2= 65 MHz
60 dBµV for RF main input
69 dBµV for RF secondary input
Optical fibre
Test point for return path transmitter (63.6 dBµV)

Keep the frequency generator connected to the transmitter in order to adjust the return path receiver

2.6. Characteristics

GENERAL		
Storage temperature		-40 to +70°C
Operating temperature withing specifications		-15 to +50°C
MECHANICAL		
Housing		Rough aluminium
Dimensions (mm) without connectors		220 x 171.5 x 106
Protection according to NFC 20010 or IEC 529		IP 55
Weight		About 2.5 kg
ELECTRICAL		
Power supply according to EN 60065		215 - 240V~ / 50 - 60 Hz (FOP 0330/221) 30 à 60 V~ / 30 à 85 V⎓ (FOP 0330/321)
Consumption		10 W max
Bandwidth		5 - 200 MHz
Input level	video carrier QPSK carrier	75 to 95 dBµV 57 to 72 dBµV
Level adjustment	variable attenuator switchable attenuator	0 to -15 dB 0 / -15 dB
Ripple	5 - 65 MHz 5 - 100 MHz 5 - 200 MHz	< ± 1 dB < ± 1.5 dB < ± 2 dB
Input impedance		75 Ω
Input adaptation		< -15 dB
OPTICAL		
Wavelength		1310 ± 30 nm
Output power		1 mW at 25°C

Specifications with a receiver FOP 0435/021

Measurement with 9 dB optical budget, optical connectors included, in the bandwidth 5 - 200 MHz

Signal type	Input level	CNR / 1 MHz (dB)	CSO (dB)	CTB (dB)	Modulation Depth typical
Two carriers F1 = 13 MHz F2 = 19 MHz	75 - 90 dBµV	60	-40	-45	35 %

Nota :

This equipment is certified by the manufacturer to comply with the norms and standards laid down in the above specifications. When this equipment is purchased, sold and/or installed, check that the mentioned norms and standard meet the legislation of the country where the product is intended to be used.

2.7 Accessories

Description	Range	Product code
Low pass filter	All pass	PAS 0226/621
	5 - 30 MHz	PAS 0226/001
	5 - 55 MHz	PAS 0226/101
	5 - 65 MHz	PAS 0226/401
	Other	On request

3. FOP 0435/021 RETURN PATH RECEIVER

3.1 Preliminary inspections

Installing and setting up the return path receivers require the following equipment :

- flat screwdrivers,
- alcohol and optical tissue,
- stranded wire (telephone pair type),
- dry air spray.

Remove the receiver from its packing and inspect it for possible damage during transport. In the event of damage, contact the transporter.

The return path FOP 0435/021 fits into a FOP 0508/011 rack.
Each rack can hold up to 8 receiver drawers and 2 FOP 0510/011 power supply drawers.

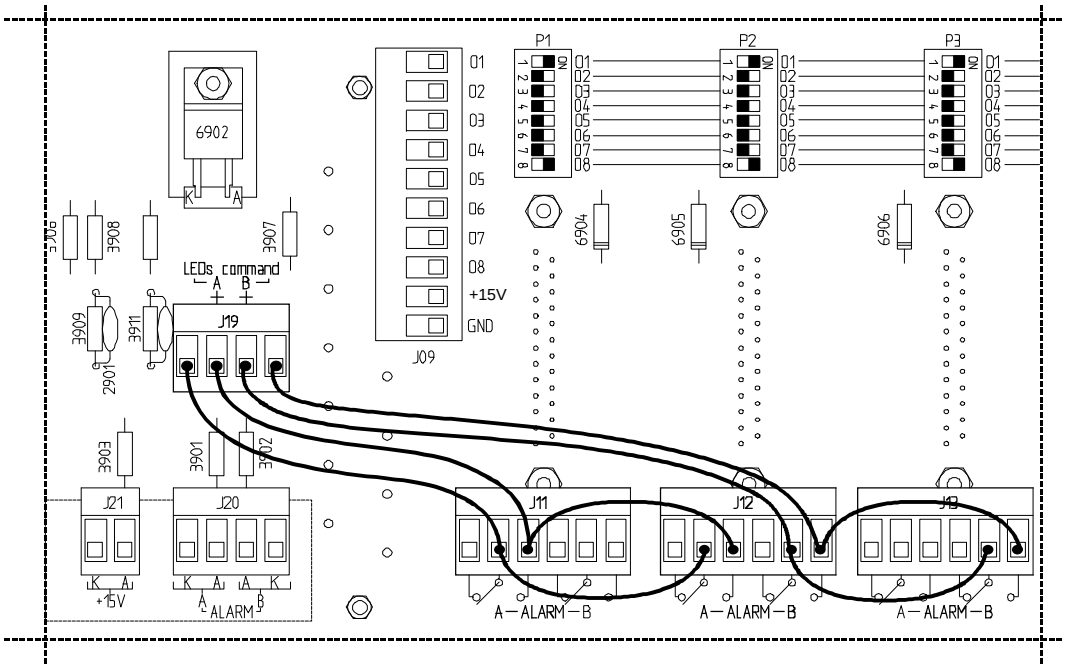
3.2 Installing the FOP 0508/011 rack

The rack is a 3U height rack that can fit into any standard 19 " bay.
However, it is strongly recommended to use a bracket in order to maintain the completely equipped rack securely in its bay.

3.2.1 Connecting the alarms (A and B LEDs)

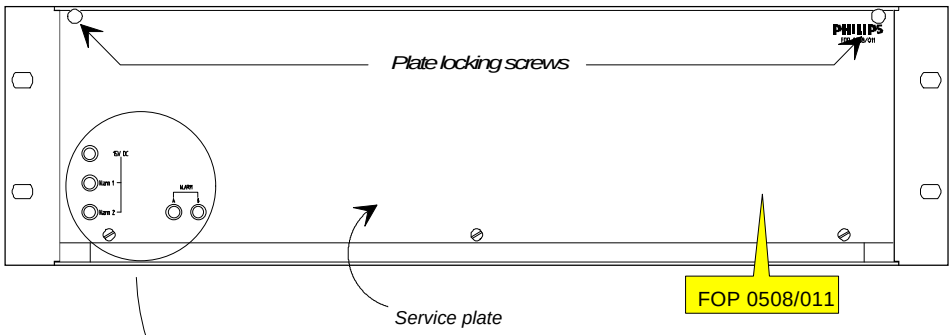
The two LEDs on the front of the FOP 0508/011 (see page 9) must be cabled so that they can light up when an alarm is detected.
The cabling is on the bottom plate (behind the service plate). See the figure below.

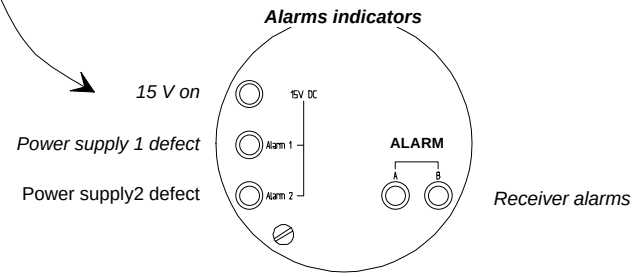
Alarms (A and B) LEDs connection at the bottom plate
Example

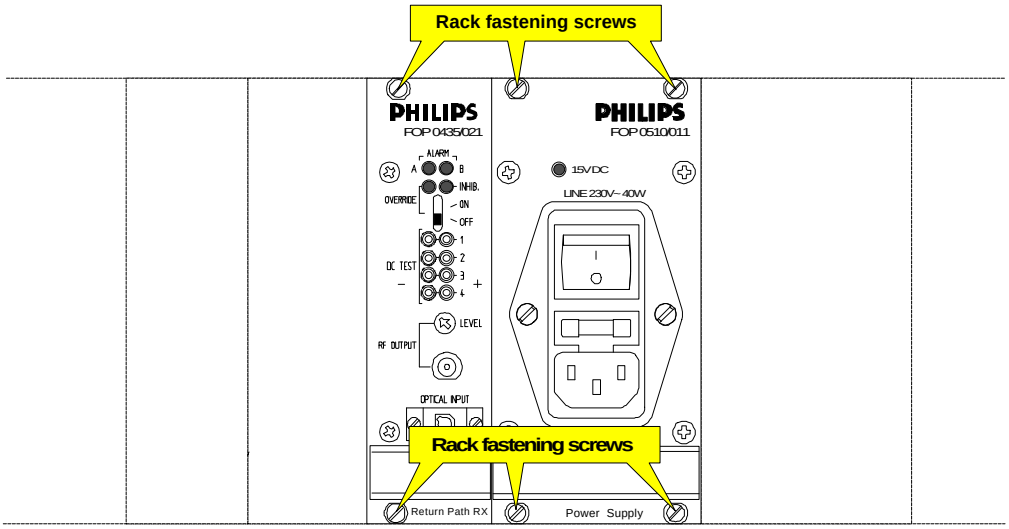


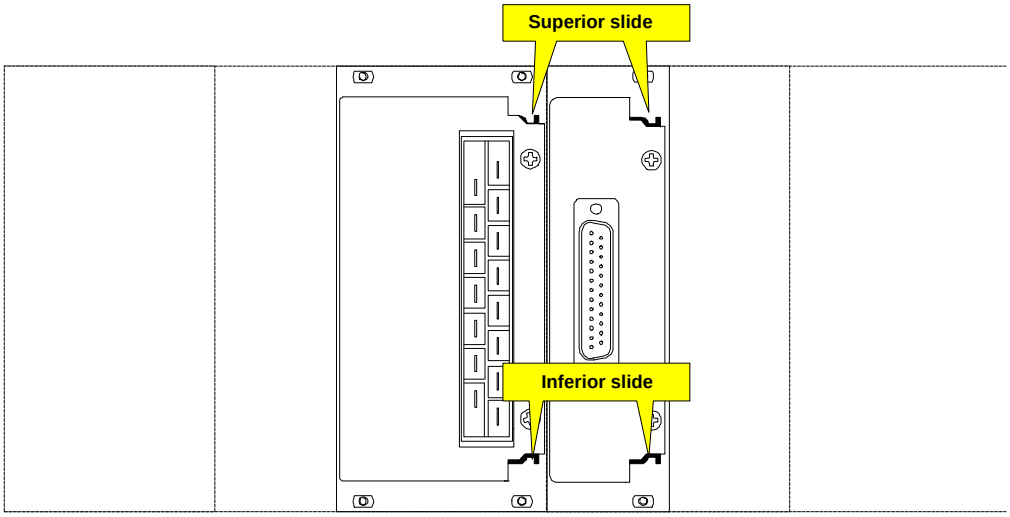
3.2.2 Overviews of the (FOP 0508/011 + FOP 0510/011 + FOP 0435/021)

Installation of {*FOP 0510/011 (power supply)* / *FOP 0435/021 (receiver)*} *in a FOP 0508/011 (19"rack)*









3.3 Installing a FOP 0510/011 power supply

This module supplies 15 Vdc. to the receiver drawers.

- Insert the power supply module carefully along the slide rails into the rack.

- Push the module all the way to the stop plate.

- Using a flat screwdriver, tighten the two screws on the front.

- Plug in a mains cable (2P + T) and connect the module to 230 V mains supply.

From this point on, the module can be turned on using the mains switch.

It is recommended to use two power supplies in parallel, each used at 50% of its capacity for the advantages of :

- improving the life span of both supplies,
and guaranteeing continuous operation of the rack and drawer assembly in the event of a breakdown of either supply.

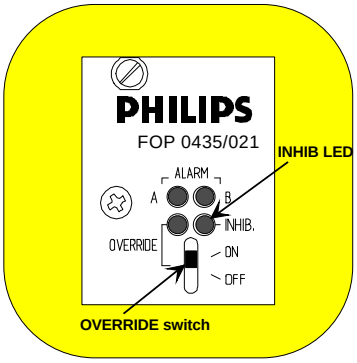
3.4 Installing the FOP 0435/021 receiver drawer

- Insert the receiver carefully along the slide rails into the rack.

- Push the module all the way to the stop plate.

- Using a flat screwdriver, tighten the two screws on the front.

Inhibition of the monitoring system on the receiver



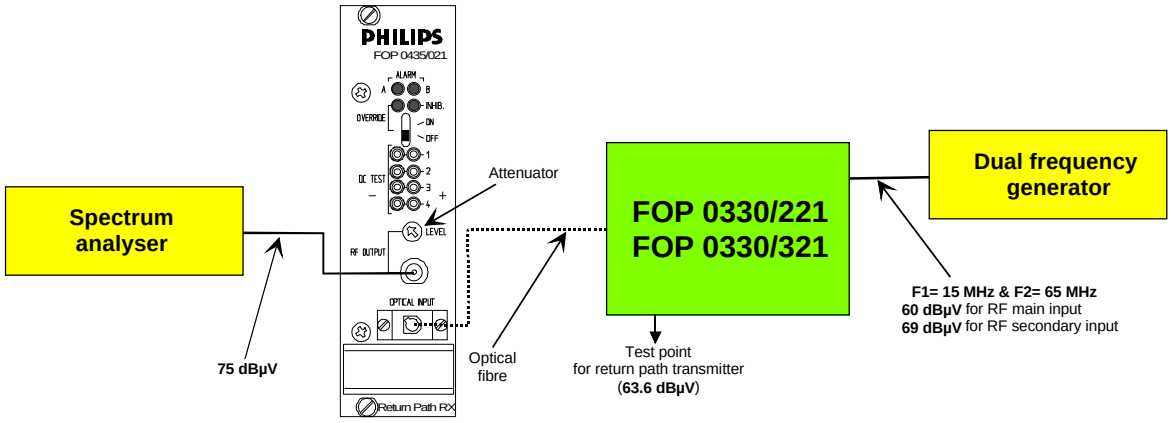
The optical receiver is prepared to operate with optical transmitters integrable in return path optical transmitter, type FOP 0330/021 or FOP 0330/121.
Associated with FOP 0330/221, FOP 0330/321, the monitoring management must be inhibited. For that change the “OVERRIDE“ switch position to ON.
The “INHIB“ LED blinks, showing that the system is correctly working without monitoring management.

3.5 Commissioning of receiver

- Connect a spectrum analyser to RF output of the return path receiver ref. FOP 0435/021.

- Adjust the return path receiver by using the attenuator on the optical return path receiver, in order to have the output level indicated in the table **(Example : 75 dBµV for 10 dB optical budget).**

	Optical Budget					
	4 dB / 5 km fibre		6 dB / 10 km fibre		10 dB / 20 km fibre	
Bandwidth used for QPSK channels	CNR (dB)	Output level (dBµV)	CNR (dB)	Output level (dBµV)	CNR (dB)	Output level (dBµV)
10 to 30 MHz	**38.5**	**88.5**	**40**	**84.5**	**42**	**76.5**
15 to 55 MHz	**40**	**86.5**	**41**	**82.5**	**41**	**74.5**
15 to 65 MHz	**40**	**85.5**	**41**	**81.5**	**40**	**73.5**



Value voltage (V) (Measured to the RF output of the receiver)	**Optical Budget (dB) between the transmitter and the receiver**
11.5 +/- 0.3	**0**
6.67 +/- 0.3	**4**
4.84 +/- 0.3	**6**
2.95 +/- 0.3	**10**
1.7 +/- 0.3	**Damaged fibre**